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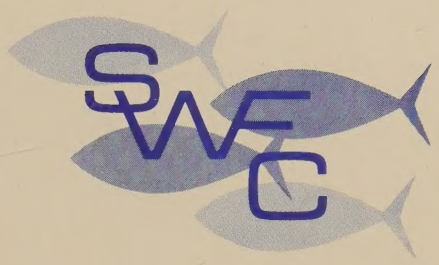

SOUTHWEST FISHERIES CENTER

MONTHLY REPORT - OCTOBER 1982

TABLE OF CONTENTS AND RESEARCH HIGHLIGHTS

	PAGE
PUBLICATIONS	1
HONOLULU LABORATORY	4
Research Cruise Conducted to Investigate Central North Pacific Seamount and Other Resources	4
New Distributional Record Set for Deepwater Shrimp	5
LA JOLLA LABORATORY	9
1982 CalCOFI Conference Held	9
Daily Egg Productions Estimated for 1951-1982	13
California Sea Lion Tagging Studies Continue	18
TIBURON LABORATORY	26
Soviet-American Rockfish Venture Successful	26
PACIFIC ENVIRONMENTAL GROUP	31
Northern Anchovy Analysis Completed	31
FISHERIES INFORMATION SYSTEMS AND AUTOMATIC DATA PROCESSING	33
Microcomputer Assembly Workshop Conducted	34
Marine Mammal Stranding File for Southwest Region	35
MISCELLANEOUS	37
Honors, Awards, Seminars, Public Affairs, Visitors Meetings and Travel, and Personnel	37

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SOUTHWEST FISHERIES CENTER
LA JOLLA, CALIFORNIA

HONOLULU LABORATORY
LA JOLLA LABORATORY
TIBURON LABORATORY
PACIFIC ENVIRONMENTAL GROUP

MONTHLY REPORT - OCTOBER 1982

STATUS OF PUBLICATIONS

Published

Mendelssohn, Roy. 1982. Discount factors and risk aversion in managing random fish populations. Can. J. Fish. Aquat. Sci. 39:1252-1257.

The effects of changes in the discount factor as compared with the effects of changes in risk aversion are examined for a simple stochastic model of fish population dynamics. Numerical results suggest that both optimal harvesting strategies and the resulting population dynamics are insensitive to changes in the discount factor, whereas changes in the degree of risk aversion in the utility function do cause significant changes in both. When risk averse utility functions are viewed as total revenue curves with marginal prices that decrease with supply, the results suggest that the more sensitive price is to supply, then the resulting optimal harvesting policy is smoother. Theoretical results are presented which suggest these results are robust beyond the specific model.

Ralston, Stephen. 1982. Influence of hook size in the Hawaiian deep-sea handline fishery. Can. J. Fish. Aquat. Sci. 39:1297-1302.

Experimental bottom fishing trials were conducted in the Northwestern Hawaiian Islands where four different hook sizes (Nos. 28, 30, 34, and 38) were fished simultaneously. Within this series the biggest hook is about 71% larger than the smallest hook. Alterations in gear within this range have no substantive effect on the catch of bottom fish. In all cases examined, variation in catch statistics associated with differing replications (days and sites) greatly exceeded any effect

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attributable to different hook sizes. It is concluded that for medium- and large-sized fish, the catch is reasonably representative of this fish which strike the hooks and that a sigmoid selection curve most accurately describes the selective properties of the gear in this fishery.

Sakagawa, Gary T. and Philip E.K. Symons. 1982. The International Skipjack Year Program of the International Commission for the Conservation of Atlantic Tunas. Fisheries, 7(3):12-17.

A four year research program to obtain information for assessing the condition of the Atlantic skipjack tuna, Katsuwonus pelamis, population for developing plans for the rational exploitation of the resource was initiated by the International Commission for the Conservation of Atlantic Tunas (ICCAT) in 1979. The program has so far contributed to the development of a new fishery off Brazil, completed exploration of potential fishing areas in the Caribbean Sea and off Angola, sponsored tagging of 27,000 fish, and generated a considerble amount of fishery statistics and biological information. Analysis of the data and information is planned for 1982 and a scientific meeting is planned for 1983 to review the results and relate them to the needs of the ICCAT.

Shomura, Richard S., and Walter M. Matsumoto. 1982. Structured flotsam as fish aggregating devices. NOAA Tech. Memo., NMFS, NOAA-TM-NMFS-SWFC-22, 9p.

A modern adaptation of an old fishing technique is gaining recognition in the Pacific and elsewhere as an effective means to increase fishing productivity in the open sea. The use of man-made, free floating, and anchored floating devices to aggregate pelagic fishes for subsistence, recreational, and commercial fishing has increased markedly in recent years; estimates of deployed and planned units exceed 1,000. These devices have been anchored in depths ranging from several hundred to several thousand fathoms. This report reviews the development and present use of fish aggregating devices in the Pacific and Indian Oceans.

Translations

Ino, Takashi. 1950. Observations on the number of spawnings in the ise-ebi (Panulirus japonicus (V. Siebold)). Bull. Jpn. Soc. Sci. Fish. 15(11):725-727. (Engl. transl. by Wilvan G. Van Campen, 1982, 6 p., Transl. No. 74; available Southwest Fish. Cent., Natl. Mar. Fish. Serv., NOAA, Honolulu, HI 96812).

Honolulu Laboratory

Administrative Report

Ikehara, Walter N. 1982. Using artificially induced locomotion in the measurement of active respirometry rates from skipjack tuna, Katsuwonus pelamis. SWFC Admin. Rep. H-82-17C.

Skillman, Robert A., Thomas S. Hida, and Bernard M. Ito. 1982. A note on the number of fishing vessels in Hawaii. SWFC Admin. Rep. H-82-18.

Approved by Center Director

Kramer, Steven, H. Note on the capture of a new species of hagfish, Genus Eptatretus, in the Northwestern Hawaiian Islands. Pac. Sci.

Wetherall, Jerry A. Status of the South Pacific albacore. (Abstr.) 15th Pac. Sci. Congr. Proc., Dunedin, New Zealand, 28 January to 11 February 1983.

HONOLULU LABORATORY

INSULAR RESOURCES INVESTIGATION

Research Cruise Conducted to Investigate Central North Pacific Seamount and Other Resources

Richard N. Uchida, Leader, Insular Ecosystem Study Task, reported that the NOAA Ship, Townsend Cromwell, departed Honolulu on October 19 on cruise 82-05 to waters of the Northwestern Hawaiian Islands (NWHI) and the central North Pacific seamounts. Two major missions of the cruise are to: 1) collect data on depth distribution, food and feeding habits, age and growth, and density of pelagic armorhead and alfonsin over the central North Pacific seamounts, and 2) conduct trapping and handlining operations to collect data for ongoing studies on size at first maturity of the spiny lobster, Panulirus marginatus, attraction/avoidance behavior of lobsters to offal, spiny lobster density on the fishing grounds as determined from data on trap spacing, and age and growth of fishes in the snapper-grouper complex. Uchida stated that the secondary missions of the cruise are to conduct experimental fishing with squid jigging machines, test the feasibility of using underwater television equipment to observe lobster and bottom fish habitat and behavior, and to deploy fish aggregating devices.

The scientific field party for the first phase of the cruise includes Chief Scientist James H. Uchiyama and research assistants Steven H. Kramer, Alan R. Everson, and James H. Prescott. Scheduled to join the field party at Midway Islands for the second phase of the cruise are Uchida and research assistant Michael P. Seki.

Manuscript Preparation Continuing

Reginald M. Gooding, Fishery Biologist, revised the manuscript, "Predation on released spiny lobster, Panulirus marginatus, during tests in the Northwestern Hawaiian Islands"; research assistants Robert L. Humphreys, Jr., and Steven Kramer revised their manuscript, "Ciguatera and the feeding habits of the amberjack, Seriola dumerili, in the Hawaiian Archipelago"; and research assistants Darryl T. Tagami and Michael Seki began summarizing handline fishing data for a paper they are preparing for the second NWHI symposium.

Richard Uchida, Leader of the Insular Ecosystems Study Task, and Seki continued work on two reports for the NOAA Office of Ocean Minerals and Energy: "Summary of pertinent information on the attraction/avoidance effects of structures placed in tropical and subtropical waters of the Pacific Ocean," and "Summary of pertinent biological characteristics of potential Ocean Thermal Energy Conversion (OTEC) sites in the Pacific Ocean."

Uchida also reviewed research assistant Victor A. Honda's manuscript, "Studies on fecundity of the spiny lobster, Panulirus marginatus (Quoy and Gaimard), in the Northwestern Hawaiian Islands," a socio-economic research project documentation for the Fishery Management Research Program, and a bottom fish programmatic assessment document prepared by the Western Pacific Regional Fishery Management Council (WPRFMC).

New Distributional Record Set for Deepwater Shrimp

Robert B. Moffitt, Fishery Biologist, reports the capture of a deepwater caridean shrimp, Heterocarpus gibbosus, in traps fished at 200 fathoms around Asuncion Island on Townsend Cromwell cruise 82-04 in the Mariana Archipelago. Although H. gibbosus is abundant in Fiji, this represents the first record of its occurrence in the Mariana Archipelago. Heterocarpus gibbosus is a relatively large deepwater shrimp, about the same size as H. laevigatus, which is usually found in deeper water. Including H. gibbosus, the occurrence of seven species of Heterocarpus has now been documented in waters of the Mariana Archipelago.

* * * * * * * * * *

Dr. Jeffrey J. Polovina, Leader, Resource Assessment Investigation of the Mariana Archipelago (RAIOMA), prepared an administrative report, "A statistical sampling guide to inspect dockside landings of spiny lobster catches for adherence to the regulations in the FMP for spiny lobsters." The report was prepared to aid enforcement agents in implementing the regulations for the spiny lobster FMP.

* * * * * * * * * *

Paul M. Shiota, Fishery Biologist, completed the cruise and narrative reports for Townsend Cromwell cruise 82-04, and Dr. Stephen Ralston, Fishery Biologist, completed the narrative report for cruise TC-82-03. Dr. Ralston also revised his manuscript, "Analyzing the width of daily otolith increments to age the Hawaiian snapper, Pristipomoides filamentosus," for resubmission to Fishery Bulletin.

FISHERY MANAGEMENT RESEARCH PROGRAM

Recreational Fishery Data Updated and Summarized

Thomas S. Hida, Fishery Biologist, reports that fish catch data from the January 1981-August 1982 issues of Hawaii Fishing News were entered into the Laboratory's data management system, and research assistant Nathaniel T.

Shippen obtained computer summaries of 1981 catches by species and month for each island from this data set.

Shippen also prepared summaries of the catch by species, by quarter and year, plus weight frequency tables for the charter vessel, Mele Moku. Research assistant James C. Cooper updated the fiscal year 1982 vessel name list provided by the Hawaii Department of Transportation, and obtained computer summaries of commercial and pleasure vessels in Hawaii.

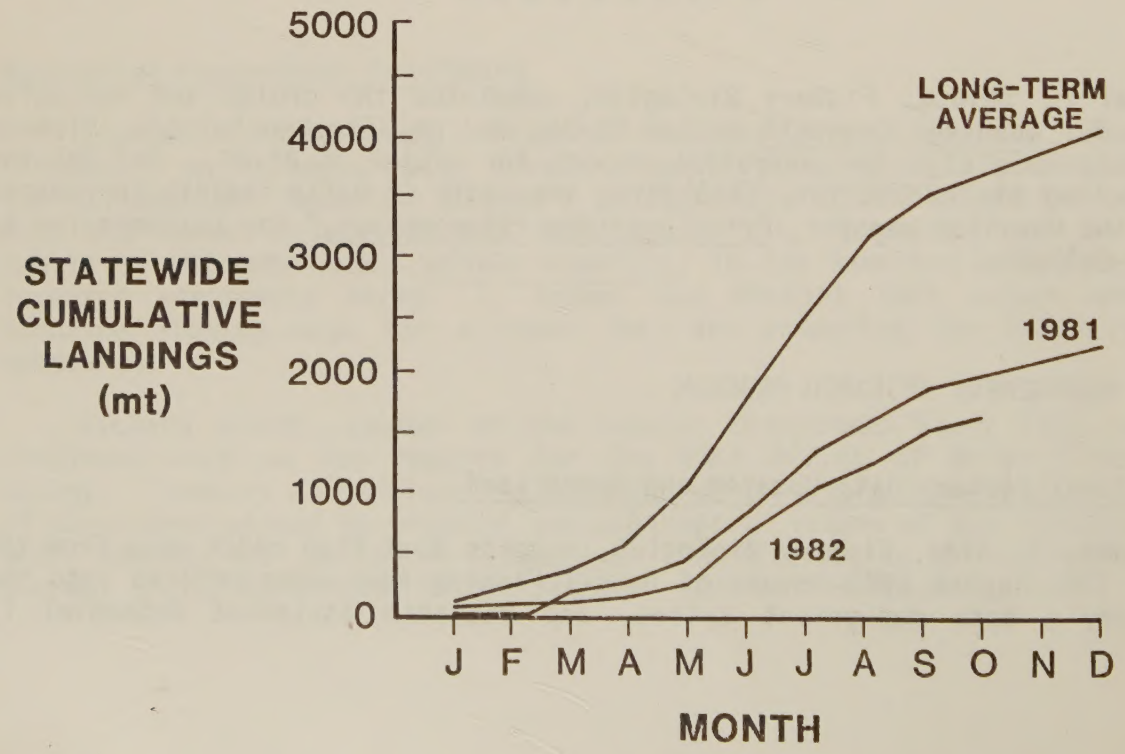
Hida also reports that one of Oahu's largest recreational fishing clubs has provided him with weight slips of fish from its fishing tournaments. These data will be incorporated in the Laboratory data base.

* * * * * * * * * *

The manuscript, "The Hawaiian seabird feeding ecology," by Craig S. Harrison, Fish and Wildlife Service, and T. Hida, and M. Seki was returned to the authors for revision by the editor of Wildlife Monographs.

Hawaii Landings of Skipjack Tuna Continue Below Long-Term Average

The October 1982 Hawaii landings of skipjack tuna were estimated at 75 metric tons (MT), which is 15 MT below the October 1981 landings and 172.0 MT below the 1964-79 long-term average for October. The cumulative landings from January through October were estimated at 1,635 MT, which is 396 MT below the 1981 landings for the same period and 2,056 MT below the 1964-79 long-term average for the same period (Figure 1).



Computer Program to be Tested in Simulation Study Fishing Vessel Operations

Samuel G. Pooley, Industry Economist, reports that research assistant James Cooper has succeeded in implementing the Texas A & M computer program simulating fishing vessel operations on the University of Hawaii Computing Center's IBM 370/158. The simulator accepts a wide range of continuing data sets and can produce a variety of financial reports. Data from the Honolulu Laboratory's contractual study of the Hawaii charter fishing industry will be entered into this simulator to test its transportability and applicability in modeling this segment of the Hawaii fishery.

PELAGIC RESOURCES INVESTIGATION

Work Continues on Tuna Bioenergetics and Behavior

Dr. Richard Brill, Leader, Experimental Ecology of Tunas Task, reports that work is continuing on various aspects of tuna bioenergetics and behavior.

Michael M. Walker, University of Hawaii graduate student, is continuing work on several aspects of the magnetic compass sense of tunas. Behavioral experiments on the ability of yellowfin tuna to detect changes in the earth's magnetic field should be completed shortly and the results will be included in a manuscript for publication. Walker has also been using a transmission electron microscope to examine the suspected magnetic receptor organ. Structures have been seen that have been tentatively identified as nerves and also what appear to be magnetite crystals themselves. Walker hopes to positively identify the structures now suspected as being magnetite from their electron diffraction patterns.

Christopher Boggs, University of Wisconsin graduate student, has continued his studies on the bioenergetics of tunas. Boggs has been using the novel technique of clipping the pectoral fins of yellowfin tunas as a method of including an increase in the fish's swimming speed on a sustained basis. This technique will allow him to measure the energy consumption of these animals at elevated swimming speeds.

Dr. Kim Holland, Hawaii Institute of Marine Biology, University of Hawaii, reports that he has begun testing the effects of artificial squid odors on yellowfin tuna. The fish definitely responded well to these new odors, but the actual efficiacy of these new odors has not yet been quantified. Holland also reports that he will begin testing the responses of skipjack tuna to natural prey odors. These tests should provide data to compare with those obtained earlier on the responses of yellowfin tuna to various odors.

In conjunction with Holland's work, Brill has been developing techniques to measure the electrical responses of the nasal receptor organ in tuna to odor stimuli. This procedure involves measuring small (0.2 mV or less) d.c.

electrical potential changes in response to odor presentation; Brill has been successful in routinely using the procedure in mullet, and tests on tuna should begin next month. This technique will allow the rapid testing of the tuna's responses to several natural prey odors and odor concentrations. The work is specifically designed to complement Holland's behavioral studies.

Mahimahi Larvae Reared for Growth and Survival Studies

Sharon D. Hendrix, University of Hawaii graduate student, and Thomas K. Kazama, Fishery Biologist report that the spawning project group is currently rearing two species of mahimahi, Coryphaena equiselis and C. hippurus. The larvae are being used in tests of food selection and the effects of various diets (copepods and rotifers) on larval growth and survival. This work should yield information not only on the early life history of these species, but also provide data useful for improving next year's skipjack tuna larvae rearing trials.

Statistical Procedures to Estimate Allometry and Maturation Parameters Developed

Dr. Jerry A. Wetherall, Leader, Pelagic Stock Assessment Task, has completed a manuscript describing new statistical procedures for estimating parameters of allometry and maturation on the basis of morphometric data. The paper was motivated by studies on the spiny lobster, Panulirus marginatus, in Hawaii by research assistant James H. Prescott. Prescott is preparing a companion paper applying the new technique, as well as standard methods, to the lobster data.

In the new procedure, a mathematical model is constructed to describe the probability of maturity as a function of the size of a reference body dimension (e.g., carapace). Maturation is viewed either as a gradual process or a step function from juvenile to adult phases. The maturation models are combined with phase-specific allometry equations which relate the size of a second body part (e.g., leg) to the reference part. The result is a series of nonlinear regression models, whose form depends further on assumed error structure and side conditions.

Maximum likelihood estimates of model parameters and associated asymptotic covariance matrices are computed using an iteratively reweighted Gauss-Newton algorithm available in standard statistical software packages, e.g., BMDP and SAS. Correct statistical weights are developed in the paper. The methods are evaluated cursorily using artificial data sets generated by Monte Carlo methods. Limitations of the models and advantages over existing procedures are discussed.

A NMFS technical memorandum is being prepared by Wetherall and Marian Y.Y. Yong, Mathematician, to outline the use of SAS and BMDP packages in applying the new methods.

LA JOLLA LABORATORY

Coastal Fisheries Resources Division

1982 CalCOFI Conference Held

Scientists from the Coastal Division contributed to the Annual California Cooperative Oceanic Fisheries Investigation (CalCOFI) Conference held this month at the University of Southern California's Conference Center in Idyllwild, California. Other contributions came from scientists from the California Department of Fish and Game, Moss Landing Marine Laboratories, University of California Sea Grant program, and the National Marine Fisheries Service. The presentations will be included in the next volume of CalCOFI Reports, and should constitute a useful reference document.

New Coastal Division staff member Alec MacCall, Fishery Biologist, convened a symposium entitled "The larger pelagic fishes of the California Current," which occupied most of the first day. MacCall presented a paper with fishery biologist Gary Stauffer (Northwest and Alaska Fisheries Center) on jack mackerel of the northeastern Pacific.

Other topics included discussions of Pacific mackerel, jack mackerel, sharks, billfish, Pacific bonito, white seabass, yellowtail, California barracuda, northern bluefin tuna, north Pacific albacore, and symbiosis between ocean sunfish and seabirds.

Posters illustrating their research were presented by fishery biologist Dr. Paul Smith, and Connie Fey of the Scripps Institution of Oceanography (anchovy egg pattern intensity with time); statistician Susan Picquelle and fishery biologist Roger Hewitt (anchovy spawning biomass for 1982-1983).

Oral presentations were made by fishery biologist Gail Theilacker and Hewitt (starvation of jack mackerel larvae); fishery biologists John Butler and Richard Methot (anchovy birthdate distribution); fishery biologist John Hunter (planktonic and nektonic anchovies); Methot again (biomass and age composition of anchovy); physical scientist Paul Fiedler, oceanographer Mike Laurs and physiologist Reuben Lasker (remote sensing, albacore and anchovies); Paul Smith (use of the median in statistical analysis); mathematician Nancy Lo (historical anchovy egg production) and Hewitt (nearshore production of young anchovy).

According to Lasker, Convenor of the CalCOFI Conference, the conference was outstanding both from the point of view of the breadth of topics covered and the quality of the scientific reports.

ECOLOGY AND TAXONOMY OF FISHES, CALCOFI

Update on Ahlstrom Symposium Preparations

Progress continues on manuscripts being prepared for the Ontogeny and Systematics of Fishes Symposium to be held next year to honor the memory of Dr. Elbert Ahlstrom, world-famous larval fish taxonomist on the staff of the La Jolla Laboratory, who died in 1979.

Staff members assisted with analysis of deep-sea smelt larvae for a manuscript being prepared by Dr. David Cohen (Los Angeles County Museum of Natural History) and fishery biologist Dr. Geoffrey Moser. Ann Matarese, Biologist, Northwest and Alaska Fisheries Center, visited the laboratory and collaborated with Betsy Stevens, Biological Laboratory Technician, on a review of blennioid larvae being prepared for the symposium. She also worked with Elaine Sandknop, Biological Technician, on a symposium presentation dealing with fish egg identification.

Also in relation to the symposium, Dr. Erik Bertelsen of the University of Copenhagen, visited the laboratory October 18-22 and worked with Dr. Moser on a manuscript to be presented in August. David Ambrose, Biological Technician, completed a manuscript with other staff members on the early life histories of two cusk eel species.

Curation of CalCOFI Collection Continues

Victor Gorospe,, Biological Aid, has curated a major portion of the early CalCOFI egg and larval collection. He has now completed 85 cruises encompassing the first 7 years of the program and has produced some interesting data on the preservation of ichthyoplankton samples.

COASTAL EASTERN PACIFIC: POPULATION BIOLOGY OF FISHES

Dr. Alvariño returns from Mexican Teaching Assignment

During the period October 4-29, Dr. Alvariño has been at La Paz, Baja California, Mexico, presenting an advanced course on zooplankton, ocean dynamics, and fisheries to graduate biologists at the Interdisciplinary Center of Marine Sciences (CICIMAR) of the National Polytechnic Institute of Mexico. During this period, projects of pertinent research were developed by the biologists attending the course. She designed and supervised those projects of research and provided the necessary information and bibliography. These 15 biologists came from CICIMAR, University of National Autonomous of Mexico, (UNAM), University Autonomous Metropolitan of Mexico, D.F. (UAM), University

of Baja California Sur, La Paz (UABS), National Polytechnic Institute of Mexico, D.F., Center of Marine Studies and Technology of Fisheries, La Paz, Center of Fisheries Research at La Paz.

Albacore Otolith Ageing Study Completed

Susan Longinotti, University of California, San Diego, Marine Life Research Group, completed a study of albacore ageing using daily otolith increment counts which will be compared to ray yearly ring counts to establish if rays can be used for ageing. Twenty-two specimens of Thunnus alalunga were obtained where both otoliths and fin rays were available. The otolith's daily increments were counted to determine the age of the specimens. Keith Ketchen of the Pacific Biological Station, Nanaimo, B.C., Canada, read the fin rays.

The procedure for reading the albacore otoliths required learning the acetate replicating technique from Alex Wild, Inter-American Tropical Tuna Commission. He used several fish for teaching purposes which were not included in Figure 1.

A clear relationship is seen between age, as determined from daily increments on otoliths, and length.

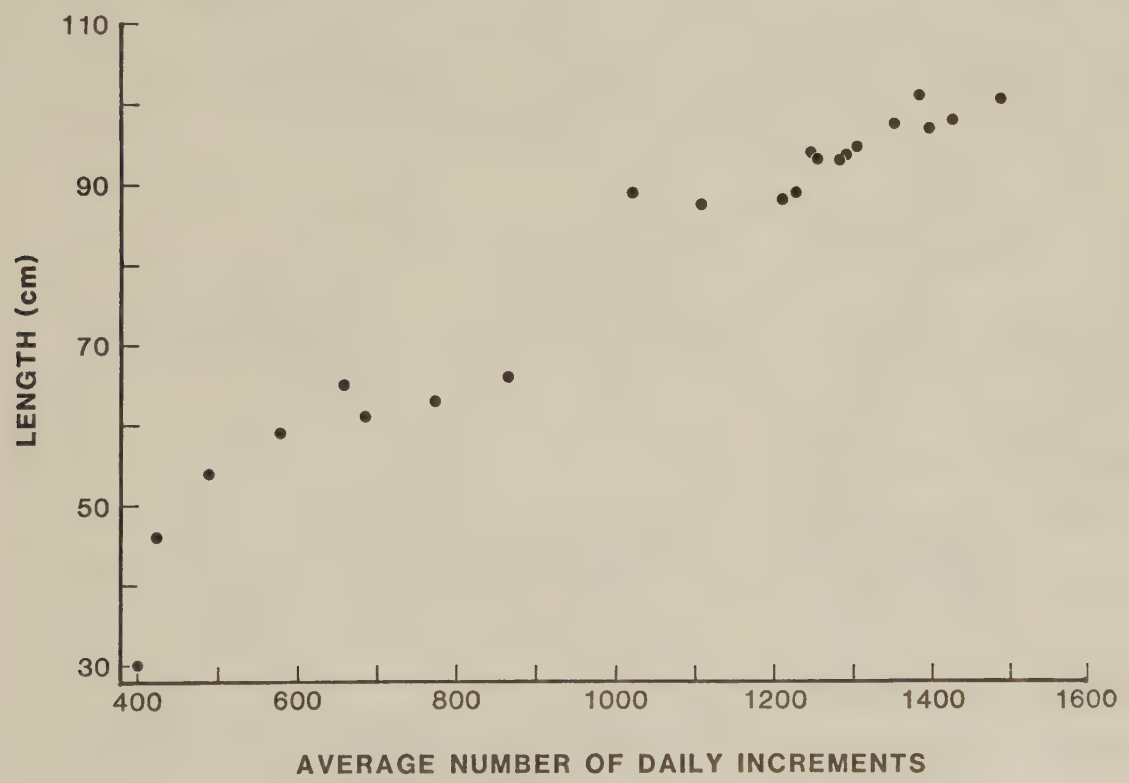


Figure 1. Length vs number of otolith increments of albacore.

Larval Anchovy Growth and Survival Study Continues

Gail Theilacker, Fishery Biologist, continued to analyze data to be used in a study of larval anchovy growth and survival. The objective is to determine how variations in prey type and density affect anchovy feeding, consumption, evacuation, and growth. Using this information, Theilacker will estimate gross growth efficiencies by comparing "output" (changes in fish weight) to "input" (food weight).

To examine the effect of diet on growth, four groups of anchovy larvae were fed different diets, a rotifer (Brachionus plicatilis) diet and a harpacticoid copepod (Tigriopus californicus) diet, each at two prey levels. Consumption was determined by sampling larvae at 5 to 15 minute intervals throughout the 12-hour feeding day. Prey in the larva's gut were removed, counted, and measured. Rotifer and copepod nauplii were divided into four size classes and copepodites into two size classes. Thus to estimate consumption from number and size (width) of prey eaten, size-specific dry weights and caloric values are needed.

This summer, NOAA Junior Fellow Amy Kimball, working with Theilacker, designed techniques for weighing laboratory-cultured rotifers and copepods. Rotifers were sorted into four size classes by passing them through various nitex screens and retaining samples in which the major component was a single size class. Copepod samples were also sized by differential screening, and manually sorted to size class. Samples were rinsed, dried and weighed (Table 1); ash and caloric values of the samples will be determined.

Table 1. Weight and Size of Anchovy Larvae Prey

Prey	Width class (µm)	Dry weight per individual (µg)	Width model ln dry wt = a+b ln width	R^2
Brachionus plicalitis				
Rotifers	74.3-109.7	0.10		
	109.8-146.7	0.22	lny = 3.05 + 2.23 lnx	995
	146.8-183.8	0.41		
	183.9-195.0	0.47		
Tigropus californicus				
Nauplii	74.3-109.7	0.04		
	109.5-146.7	0.13	lny = 3.89 + 2.92 lnx	98.0
	146.8-183.8	0.25		
	183.9-195.0	0.38		
Copepodites				
	146.8-183.8	0.63		
	183.9-195.0	1.20		

Daily Egg Productions Estimated for 1951-1982

In order to relate the anchovy biomass estimates made with the new egg production method (EPM) to those made with the old larval census method, mathematician Dr. Nancy Lo produced estimates of daily egg production of northern anchovy for the period 1951-1982. The estimates of daily egg production and larval abundance were compared, even though neither of the two parameters are perfect indices for spawning biomass. The daily egg production is considered to be a better index of biomass change than is the larval abundance, because the former takes into consideration egg-larvae mortality, whereas the latter does not.

Lo constructed two series of daily egg production: Series I assumes a constant instantaneous mortality rate for egg stage, and Series II assumes a constant instantaneous mortality rate for egg and yolk-sac larvae. The egg production was computed for the central stock of northern anchovy, with 0.05 m^3/1m depth as the standard sampling unit.

The estimated egg production ($\hat{P}_0$) from series II and the larvae abundance (La) are plotted for comparison (Figure 1). Both estimated egg production and larvae abundance indicate that the current spawning biomass is at the level of spawning biomass in the middle 1960's. The egg production estimates fluctuate more than the larvae abundance due to the natural variability and sampling error of the estimates.

The egg and larva mortality rates (α and β) were estimated for each year of 1951-1882 (Figure 2). Mortality rates for both stages vary from year to year. As a result, high egg production does not guarantee high larvae abundance and vice versa.

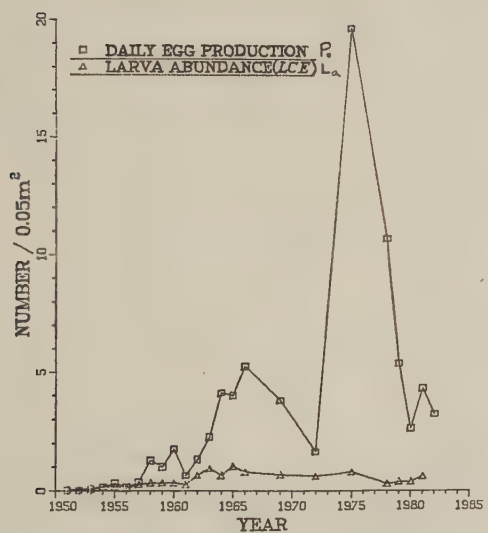


Figure 1. Daily egg production (P_0) and larva abundance (L_a) of northern anchovy, 1951-1982.

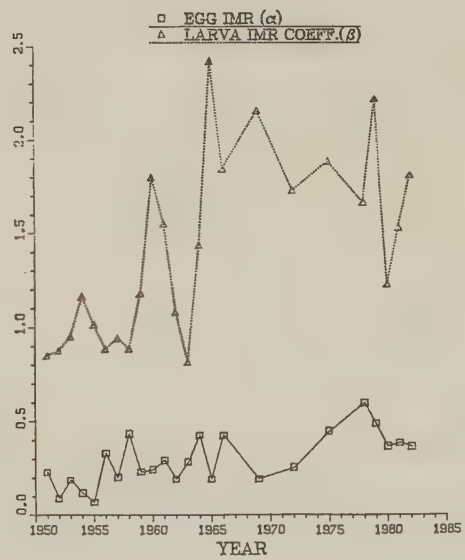


Figure 2. Egg instantaneous mortality rate (α) and larva instantaneous mortality coefficient (β) of northern anchovy, 1951-1982.

The model used in estimating the egg production time series differs from the method used in the current "Egg Production Method" (EPM) in that the current EPM constructs an egg mortality curve directly from staged eggs grouped by age classes, whereas the model for the historical time series relies upon the total egg abundance and larvae grouped by age classes. For the purpose of verification, the egg production ($\hat{P}_0$), egg mortality (α), and the egg abundance from both methods were presented. The point estimates from both methods are quite close, yet the precision of the estimates from the current EPM is much higher than that from the model used for the historical egg production time series (Table 1).

Table 1. Egg production ($\hat{P}_0$), egg instantaneous mortality (α) and the egg abundance ($\bar{x}_w$) for northern anchovy in CalCOFI regions 4.5, 7, 8, 9, 11, 13, and 14; January-April, 1980-1982.

	1980		1981		1982	
	$\hat{P}_0$ (S.E.)	(S.E.)	$\hat{P}_0$ (S.E.)	(S.E.)	$\hat{P}_0$ (S.E.)	(S.E.)
Series I	2.33 (1.46)	0.37 (0.21)	3.95 (2.70)	0.36 (0.24)	1.94 (1.70)	0.16 (0.20)
Series II	2.67 (1.46)	0.36 (0.08)	4.37 (2.70)	0.38 (0.08)	3.29 (1.70)	0.36 (0.09)
Current EPM	2.29 (0.51)	0.45 (0.11)	1.82 (0.31)	0.14 (0.08)	1.18 (0.32)	0.15 (6.104)

Egg abundance/0.05m^2

		$\bar{x}_w$		$\bar{x}_w$		$\bar{x}_w$
	n	(S.E.)	n	(S.E.)	n	(S.E.)
CalVET (.333 mm)	961	3.20 (0.52)	1134	4.72 (0.72)	992	3.48 (0.62)
Bongo (.505 mm)	97	4.12 (1.46)	403	6.88 (2.70)	113	4.93 (1.70)

COMMERCIAL AND RECREATIONAL FISHERIES RESEARCH FOR MANAGEMENT

Anchovy Biomass Time Series (1951-1982) Completed

The population models which will form the basis of the 1983 revision of the Northern Anchovy Fishery Management Plan require time series of anchovy biomasses. Existing time series contain years with missing data. These series include CalCOFI-based estimates of egg production and larva production (recently developed by mathematician Nancy Lo, Southwest Fisheries Center), acoustic surveys and aerial fish spotter logbook indices of abundance. Where CalCOFI-based estimates were missing, appropriately scaled acoustic and aerial indices were inserted. Finally, the complete time series was scaled according to the egg production biomass estimates of 1980-1982. These time series will appear in SWFC Administrative Report LJ-82-26, entitled "Complete northern anchovy biomass time series for 1951-1982 based on the egg production method and other indices," by Alec MacCall, Fishery Biologist.

Parameters of Anchovy Population Model Restructured

Previous anchovy population modeling has shown the power function $B_{T+1} = aB_T^b$ to provide a useful description of the stock-stock relationship. Parameters a and b are easily estimated by nonlinear regression, but are not of much direct value in themselves. Rather, management-oriented quantities such as maximum sustainable yield (MSY) and maximum net productivity level (MNPL) must be calculated from a and b. While nonlinear regression provides standard error estimates for a and b, standard errors for the derived quantities MSY and MNPL are not easily calculated. Fishery biologist Alec MacCall has solved this problem by reparameterizing the power function in terms of new parameters, specifically MSY and MNPL themselves. This new power function is

$$B_{T+1} = \frac{MSY + MNPL}{MNPL} \cdot MNPL^{\frac{MSY}{MSY + MNPL}} \cdot BT^{\frac{MNPL}{MSY + MNPL}}$$

This function allows direct estimation of the relevant management-oriented quantities together with their standard errors.

The technique of reparameterization is easily extended to more complicated models. Often there is no closed-form expression which expresses the old model in terms of the new parameters. In such cases a numerical solution can be employed within the nonlinear regression function specification. Because numerical solutions require much more computer time, the original paramaterization can be used to obtain precise initial parameter estimates for efficiently fitting the reparameterized model.

Impact on Fishery of Anchovy Population Analyzed

Dr. Richard Methot, Fishery Biologist, has expanded his analysis of the interrelationship between anchovy biomass estimates and age composition to include explicitly the magnitude and age composition of the fishery. The mortality rates and revised biomass estimates which result from this analysis are being used by Methot and fishery biologist Alec MacCall in revision of the Anchovy Management Plan for PFMC. Dr. Methot presented his results at the CalCOFI meeting in Idyllwild, California, on October 28, 1982.

The results of this analysis are best expressed by constructing a hypothetical population based on recent average parameter values. Recruitment to this population is 34 billion age 1 fish. Natural mortality rate is 0.6 for ages 1-3, 1.4 for age 4, and 1.9 for older fish. With no fishery the biomass of this population would be 1.1 million metric tons. Adding current levels of fishing mortality decreases the biomass to 0.7 million tons and harvests 0.22 million tons. These latter two values are similar to the state of the population and fishery in 1981. In this harvested population, over half of the biomass is in age 1 fish and few fish older than age 4 will be found. Such a population is susceptible to rapid changes in abundance as good and bad year classes occur.

Expanded Fishmeal Market Model Completed

Cindy Thomson, Industry Economist, spent most of the September-October period revising the fishmeal model. The new five-equation model represents an improvement over the old two-equation model in several respects:

1) Instead of aggregating all fishmeal, regardless of source, into single supply and demand equations, the new model recognizes differences in market behavior associated with domestically produced versus imported fishmeal.

2) The model explicitly recognizes the impact of international fishmeal prices and availability on the domestic market.

3) In the course of estimating the model, the possibility of structural changes in demand and supply after the 1972 collapse of the Peruvian anchoveta fishery is specifically addressed.

Empirical results can be summarized as follows:

1) Prior to the collapse of Peru's anchoveta fishery, when fishmeal supplies were relatively plentiful, U.S. farmers used this ingredient in broiler rations in quantities several times over and above the minimum amount required for sound nutrition. During this period demand for domestically produced fishmeal tended to decline as its own price rose relative to the price of its soybean substitute and to vary positively with feed requirements in the poultry and egg industries. The demand for domestically produced meal also rose and demand for

imported meal fell as the Peruvian (U.S. import) price rose relative to the menhaden (domestic) price.

2) In the post-1972 period, demand for all fishmeal consumed in the U.S. varied positively with changes in poultry feed requirements but became very inelastic with respect to changes in prices. Such behavior is consistent with the realities of this period in time; that is, a general tightening of supplies and the consequent use of this ingredient at minimally acceptable nutritional levels in broiler rations.

3) The data indicate that supplies of imported fishmeal in the U.S. have historically been substantial during periods when major exporting countries held large inventories for sale, and vice versa. Contrary to expectation, imported supplies appear unaffected by changes in the Peruvian (U.S. import) price relative to the European (Hamburg) price; one possible explanation for this is that the lag structure imposed on this price variable may not accurately reflect long-term contractual arrangements between fishmeal suppliers and potential customers.

4) The supply of domestically produced fishmeal showed no apparent relationship with the menhaden oil price or energy prices. In this case, fish stock availability may represent such a binding constraint on output as to prevent the data from capturing a significant price response.

Data deficiencies--specifically, errors in measurement and missing data--may be responsible for some of the empirical results which contradict a priori expectations (for instance, the failure of poultry feed requirements to affect demand for imported fishmeal prior to 1972). It is felt that any further effort to improve the model's descriptive ability would be limited by such deficiencies in the raw data. The model's predictive power, as well, might be enhanced by improvements in the data base--in particular, inclusion of prices for synthetically produced fishmeal substitutes.

Use of Median to Estimate Mean Examined

Dr. Paul E. Smith, Leader of the Survey Systems Analysis Task, presented a talk at the recent CalCOFI Conference regarding the use of the median to estimate the mean. In particular, in pollution studies where the concentrations of a pollutant can vary by orders of magnitude, the use of the median can substantially alter conclusions on the danger inherent in ingesting food at levels above Federal Drug Administration standards.

For example, at the height of the pollution of the Los Angeles, California Bight with improperly disposed of DDT, the median content of DDT in fish muscle was 8 ppm, or barely over the 5 ppm FDA standard, but the mean DDT in fish muscle was 89 ppm (see Figure 1). The meaning of the 8 ppm value is that half the fish would contain less than this amount; the meaning of the 89 ppm value is that someone ingesting several fish per year would experience an average burden well in excess of FDA standards.

Smith presented an equation with which to make unbiased estimates of the mean from the median and the range, given a multiplicate error distribution model. The assumptions are that the median is equal to the geometric mean and its bias can be corrected by the relationship between the range and the variance.

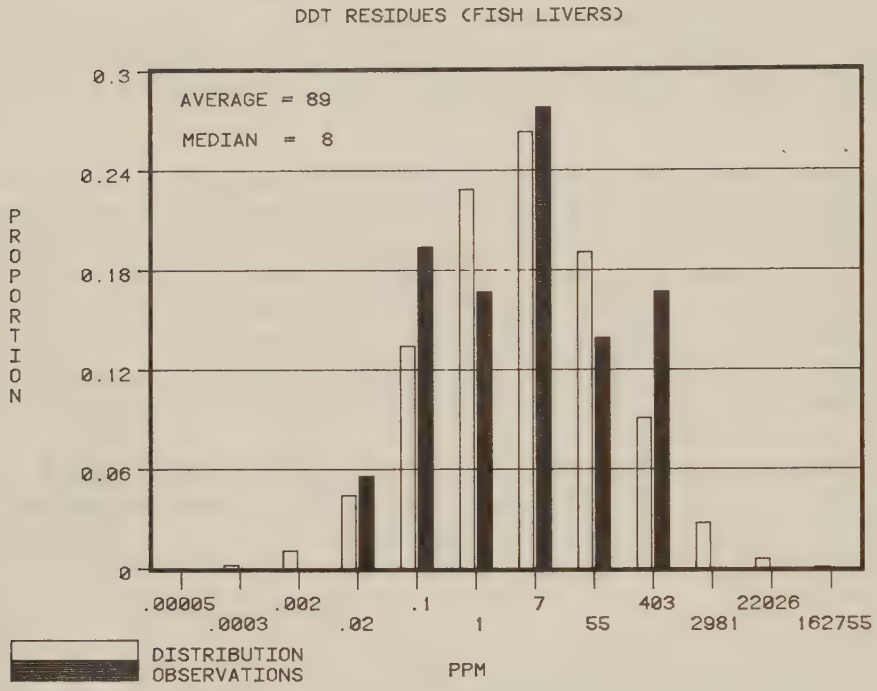


Figure 1. DDT residues in fish from Los Angeles California Bight.

Oceanic Fisheries Resources Division

California Sea Lion Tagging Studies Continue

The Coastal Marine Mammal Project initiated tagging studies on the California sea lion, Zalophus californianus, at a number of the Channel Islands during 1981. The primary activity of the study is placement of Jumbo Roto tags on the foreflippers of sea lion pups at approximately 2-4 months of age, and subsequent monitoring of the tagged animals' movements. The purpose of pup tagging is to gain information on yearly pup mortality, movements of individuals both on and between islands, feeding cycles of individuals, and ultimately, reproductive rates for known-age females.

The tagging is currently being done under contract by Carolyn Heath of the University of California at Santa Cruz on San Nicolas and Santa Barbara Islands, and by Chuck Oliver (Southwest Fisheries Center) on San Clemente Island.

The tagging operation entails transporting a work party of between 6-10 persons to the various study areas for a period of 3-6 days. At the areas, attempts are made to herd groups of pups away from the water's edge and then to individually restrain, weigh and sex the animals prior to placement of the plastic tags. Weighing of the pups is accomplished using a small hoop net and a portable tripod with scale (see photo). On some beaches, individual pups are captured with the aid of small hoop nets. The researchers monitor the condition of the animals during the operations for signs of heat stress and injury. Efforts are made to maintain normal body temperatures by keeping the animals wet through the use of water sprayers and to tag and release them as quickly as possible.

The Southwest Fisheries Center obtained a Marine Mammal Permit (No. 347) that allows tagging of up to 1600 animals over a 3-year period. The number of animals tagged is shown in Table 1 for the years 1981-82. A different tag color is used on each island to facilitate recognition of inter-island movements.

During the week of September 16, Oliver led a party consisting of Dave Holts (Southwest Fisheries Center), Dana Segars (Southwest Region), John Anderson (Southhampton College, Massachusetts), Ken Nicolson (University of California at Santa Cruz), and Steve Feldcamp (Scripps Institution of Oceanography) to San Clemente Island. On Saturday, September 18, the party captured, tagged, and released 120 pups at Mail Point. Of these, 117 were weighed. The two smallest pups weighed 20 lbs and 28 lbs, with the largest weighing 66 lbs. On Sunday, the party was only able to capture another 15 animals, primarily because of the disruption to the area the previous day. The 135 pups tagged represent approximately 20-25% of the pups born at San Clemente Island during 1982. During 1981, 71 pups were tagged, representing approximately 10% of the pups born that year at San Clemente.

Some off-island movements of pups tagged at San Clemente during 1981 have been noted. Sightings have occurred at various times of the year on the California coast between San Diego and Oxnard. Pups tagged at San Nicolas Island and San Clemente Island have also been sighted as far north as the Farallon Islands, west of San Francisco.

Table 1. The number of California sea lions, Zalophus californianus, tagged, sexed or weighed on the Channel Islands during 1981-1982 under Marine Mammal Permit Number 347.

Island	Tag color	1981 Sexed	1981 Weighed	1982 Sexed	1982 Weighed
San Clemente	White	71	0	135	132
San Nicolas	Red	192	188	298	298
Santa Barbara	Blue	99	0	124	0

Sea lion pups in pool on Mail Pt., San Clemente Island.

Mark Anderson (left - Southhampton College) and Steve Feldcamp (Scripps Institution of Oceanography) round up sea lion pups for tagging.

Ken Nicolson (left - University of California Santa Cruz) and Chuck Oliver (Southwest Fisheries Center) weigh a sea lion pup prior to tagging.

TUNA AND BILLFISH RESOURCES PROGRAM

Status of Atlantic Tuna Fishery Sampling Program

During the period January 1 to October 31, 1982, catches from three foreign tuna purse seiners fishing in the Atlantic Ocean were sampled in Puerto Rico. Seven size composition samples were collected for the Southwest Fisheries Center by Inter-American Tropical Tuna Commission personnel through a contract. The sampling distribution by species is as follows:

Species	# vessels sampled	# of samples	# of fish sampled
Yellowfin	3	5	182
Skipjack	2	2	75
Bigeye	0	0	0

Foreign-caught Atlantic tunas, transshipped to Puerto Rico, are sampled routinely for biological information by biological technician Eugene Holzapfel, who is stationed in Mayaguez. Data on fork length, weight and species composition of catches are collected. Results of Holzapfel's sampling during the period January 1 to October 31, 1982, are as follows:

Species	Gear	# of samples	# of fish sampled
Yellowfin	Baitboat	7	644
	Purse seine	20	1535
	Unknown	6	447
Skipjack	Baitboat	11	456
	Purse seine	11	551
	Unknown	4	203
Bigeye	Baitboat	1	30
	Purse seine	14	585
	Unknown	3	85
Albacore	Longline	1	50

Center Scientists Attend Meeting of ICCAT Commissioners and Advisors

On October 5-6, 1982, the Southwest Fisheries Center's (SWFC) Director, Izadore Barrett, together with Oceanic Division Chief Dr. Gary Sakagawa, and fishery biologist Dr. Norm Bartoo, attended a meeting of U.S. Advisors and Commissioners to the International Commission for the Conservation of Atlantic Tunas (ICCAT) held in Washington, D.C. At the meeting, Drs. Sakagawa and Bartoo briefed the U.S. Commissioners and Advisors on developments in the Atlantic albacore and tropical tuna fisheries during 1981-1982, and on SWFC research pertaining to these fisheries for presentation at the 1982 ICCAT meeting in Funchal, Madeira, Portugal.

Review of 1981 Fishery Statistics on Atlantic Tuna

The Southwest Fisheries Center monitors the albacore, yellowfin, skipjack and bigeye tuna fisheries in the Atlantic. Preliminary 1981 catch estimates for these fisheries total approximately 371,000 mt, an increase of approximately 5% over 1980. Catches of yellowfin and skipjack tuna increased by 15% and 13% respectively; catches of bigeye and albacore tuna decreased by 14% and 10% respectively.

U.S. commercial catches of Atlantic tropical and albacore tunas were approximately 7,500 mt during 1981, 36% greater than those for 1980. This substantial increase is primarily due to 2,100 mt of skipjack tuna caught by east-coast-based purse seiners. This catch, primarily from within 200 miles of the U.S. east coast, accounted for 40% of the total U.S. skipjack tuna catch in 1981, which overall was 70% above that for 1980. U.S. catches of yellowfin and bigeye tuna in 1981 were down 16% and 36% respectively from 1980. Albacore make up only a small part of U.S. Atlantic tuna catches, amounting to only 54 mt in 1981, an increase of 35 mt over catches in 1980.

Tropical Atlantic Tuna. During 1981 most of the tropical tuna fishing occurred in the eastern Atlantic. Led by the FISM (French, Ivory Coast, Senegalese and Moroccan) and Spanish fleets, the eastern fishery contributed an estimated 116,000 mt of yellowfin tuna (83%), and 110,000 mt of skipjack tuna (85%) of the total Atlantic catches of these species. The remainder of the 1981 yellowfin tuna data, 23,000 mt, was taken by longliners (78%) that fished in the eastern and western Atlantic, and baitboats and purse seiners (22%) that fished the western Atlantic. The remainder of the estimated skipjack tuna catch for 1981, 19,000 mt, was taken by baitboats and purse seiners off Brazil and in the Caribbean Sea.

Longliners dominated the 1981 estimated Atlantic bigeye tuna catch (48,000 mt): 77% of the overall Atlantic, 67% (23,000 mt) of the north Atlantic, and 87% (25,000 mt) of the south Atlantic catches were caught by longliners.

During 1981, eight U.S. vessels, (all class-6 purse seiners), fished in the Atlantic, primarily for tropical tunas. Four of the eight U.S. vessels fished approximately 565 days in the eastern Atlantic and caught 1,472 mt of yellowfin tuna, 2,800 mt of skipjack tuna and 128 mt of bigeye tuna. Catch rates for these U.S. vessels in the eastern Atlantic were 2.6 mt of yellowfin tuna and 5.0 mt of skipjack tuna per day's fishing. These rates are higher by 18% and 28%, respectively, when compared to those for 1980.

Five of the eight U.S. vessels fished approximately 395 days in the western tropical Atlantic during 1981 and caught 285 mt of yellowfin tuna and 448 mt of skipjack tuna. Western Atlantic catch rates were 0.7 mt of yellowfin tuna and 1.1 mt of skipjack tuna per day's fishing.

Five U.S. purse seiners, fishing primarily for bluefin tuna, caught approximately 2,100 mt of skipjack tuna off the U.S. east coast during 1981.

In 1981, the number of undersized (less than 3.2 kg) Atlantic yellowfin tuna in the U.S. fleet's landings was approximately 58% of the total number landed. This is a 28% reduction from 1980. The number of Atlantic bigeye tuna below 3.2 kg in the U.S. fleet's landings was approximately 3% of the total, a 40% reduction from 1980.

Thus far in 1982, four U.S. class-6 purse seiners have participated in the Atlantic tropical tuna fishery. They have spent approximately 150 days in the Atlantic catching an estimated 1,000 mt of yellowfin tuna and 500 mt of

skipjack tuna. Preliminary information indicates that skipjack tuna catches off the U.S. east coast during 1982 are far below those experienced in 1981.

Atlantic Albacore Tuna. The 1981 preliminary Atlantic albacore tuna catch, 56,000 mt, is down 10% from 1980. The decrease in catch occurred in the northern Atlantic, primarily by the surface fishery; south Atlantic albacore catches were relatively unchanged from 1980.

While the U.S. is a major albacore consumer, it catches only minor amounts (< 100 mt annually) of Atlantic albacore tuna. In 1981, the U.S. imported approximately 33,000 mt of Atlantic albacore tuna; 59% of the estimated total Atlantic albacore tuna catch.

Review of 1981-1982 SWFC Research Activities on Atlantic Albacore and Tropical Tuna

The La Jolla Laboratory of the Southwest Fisheries Center conducts research on Atlantic albacore and tropical tunas in support of the United States' commitment to the International Commission for the Conservation of Atlantic Tunas (ICCAT). The Center also administers a tuna port sampling program in Puerto Rico, maintains a comprehensive Atlantic tunas data base, facilitates the exchange of data between U.S. and foreign researchers and coordinates general scientific matters involving ICCAT-related research being done by U.S. scientists.

During 1981-1982, research continued on stock assessments and fishery evaluations of Atlantic tropical and albacore tunas. U.S. fisheries were monitored and biological and fishery data collected in cooperation with the U.S. tuna industry and government officials. Atlantic tuna imports were sampled for biological information in Puerto Rico. Data collected through these activities were compiled and submitted to ICCAT, as required of ICCAT members.

A document describing 1981 Puerto Rican import sampling activities has been prepared for the 1982 SCRS meeting. 1981 results indicate that 79%, by number, of the yellowfin tuna imports sampled, and 83% of the bigeye tuna imports sampled were less than 55 cm fork length. Sampling for species composition in Puerto Rico during 1981 indicated that bigeye tuna comprised approximately 8%-by-weight of the mixed yellowfin/bigeye tuna import tonnage sampled.

The production model was used to analyze the Atlantic yellowfin tuna fishery. An approach which considers the appropriateness of the different production curves on the basis of current population theory was used to calculate vectors of catch-per-unit-effort. Results indicate that maximum sustainable average yield (MSAY) is between 110,000 mt and 150,000 mt for the eastern Atlantic, and that the present fishery is operating near this level with the optimal amount of effort.

Between 1975 and 1980, review of Atlantic tropical tuna fisheries focused attention on the expansion of the surface fishery. This expansion consisted mainly of an increase in the number of large purse seiners participating in the fishery and an offshore extension of the fishery in the eastern tropical Atlantic during this period.

Single set data from the U.S. tropical tuna fleet covering the period 1968-1981 were analyzed. Changes in fishing patterns and operations were examined with respect to changes in fishing success.

The condition of the south Atlantic tuna stock was evaluated through production model analysis and Monte Carlo Simulation using updated data. The sensitivity of the results to data accuracy was investigated. The production model analysis suggests that the south Atlantic albacore tuna stock is being exploited beyond MSAY under the current pattern of fishing.

Research in support of ICCAT's International Skipjack Year Program (ISYP) is continuing. Maturity-fecundity and feeding behavior of skipjack tuna from the western Atlantic are being investigated. Gonads and stomach samples were collected from landings in Puerto Rico and Brazil. Gonads are being analyzed histologically to determine temporal/spatial distribution of spawning adults, and stomachs are being analyzed for food contents with particular attention paid to the occurrence and extent of skipjack cannibalism in the western Atlantic. A new approach to stock identification using mitochondrial DNA is also being investigated and review documents on various topics are planned for preparation in 1983. These research efforts on skipjack tuna are being focused for completion and presentation at the 1983 ISYP Conference.

Precision of Ageing Technique Tested

This month a new experiment was initiated to estimate the precision of the ageing techniques for tropical dolphins. During the reading of teeth from the 1981 female spotted dolphin specimens, a sub-sample of teeth from 40 specimens will be read three times by each of two readers. The 40 specimens will be apportioned between two size classes to investigate reader-related variance. This variance noticeably increases within and between readers when ageing animals which are longer than about 165 cm in length. Hopefully, the experiment can provide accurate estimates of between- and within-reader variance without the confounding effect of the readers' learning through time (which may be imbedded in the larger 1973-1978 data base currently under analysis).

TIBURON LABORATORY

UNDERUTILIZED FISHERIES TASK

Preparations Made for Cruise of David Starr Jordan

This month fish traps and related gear were readied for the early November cruise of the NOAA research vessel, David Starr Jordan; fishery biologists Bill Leet and Sennen Salapare will be responsible for carrying out the objectives of the fishery development task. Several lines of crab traps and shrimp traps will be set at Bodega Canyon to test the effectiveness of different gear configurations and to assess the abundance of tanner crab (Chionoecetes tanneri) and spot prawn (Pandalus platyceros).

Study Planned to Evaluate Recreational Uses of Francisco Bay Region

Industry economist Ed Ueber reports that a major portion of remaining economic program funds will be used on a study to evaluate recreational uses of the San Francisco Bay Region. The National Marine Fisheries Service will solicit proposals for the study from interested parties.

The various problems encountered in conducting fish, wildlife and water valuation studies were discussed at a meeting of the Western Association for Valuation of Ecosystems attended by Ueber. A number of possible solutions to the problems were also considered at the Friday Harbor, Washington gathering.

Soviet-American Rockfish Venture Successful

Fishery research biologist Sus Kato was invited by the Marine Resources Company to tour the Soviet factory ship Mys Orehhova, which was engaged with two American vessels in a joint-venture fishery for shortbelly rockfish. Francis Henry of the California Department of Fish and Game, Ed Melvin, of the University of California, Sea Grant, and Charles Korson of the Southwest Region also were guests of Mick Stevens, Operations Manager of Marine Resources. The party was ferried to the Soviet vessel on October 13 by Al Geyser, Captain of the Hazel Lorraine, one of the two American vessels participating in the joint venture. The other vessel was the New Janet Ann, out of Moss Landing, California.

Mys Orekhova is about 260 feet long, with a crew of 90, and has a quick-freezing capacity of around 60 tons of fish per day. She can carry about 700 tons of frozen cargo.

Fish were plentiful off Half Moon Bay, California. Around 600-650 tons of shortbelly rockfish were caught by the two American vessels in 2-weeks of

fishing, from October 2-16. Night fishing was apparently as productive as day fishing. According to a National Marine Fisheries Service observer stationed aboard the soviet vessel, the fish averaged around 25 cm, with females being somewhat larger than males. By-catch was minimal, consisting primarily of Pacific whiting, which was made into meal aboard the Soviet vessel. Splitnose rockfish were also caught in small but noticeable numbers.

Shortbelly rockfish were packed whole in 10-kg blocks, and frozen for 3-4 hr in a -40°C blast freezer. The blocks were then glazed and packed in 30-kg master cartons, and stored at -20°C.

The Soviet captain was impressed by the quality of shortbelly rockfish, especially its fat content and flavor. He felt that the fish would be well accepted in the Soviet Union. The fish will apparently be test-marketed in several forms: frozen, smoked and dried.

According to Kato, the success of this joint venture fishery should prove to U.S. industry that shortbelly rockfish can be consistently caught in large numbers with very low by-catch of other fish. Whiting can, however, sometimes be taken in large numbers by mistake, so consideration should be given to keep that species apart in any by-catch allowance quotas when fishing for shortbelly.

FISH COMMUNITY INVESTIGATION

Variation in Hawaiian Reef-Fish Communities Studied

The Marine Resources of the Northwest Hawaiian Islands have been studied since 1977 by a joint effort of the National Marine Fisheries Service, U.S. Fish and Wildlife Service and the State of Hawaii (University of Hawaii and the State Department of Natural Resources). Dr. Edmund Hobson, Leader of the Fish Communities Investigation at the Tiburon Laboratory, has contributed to this program since its inception. Based on his extensive experience with the Hawaiian fauna, Dr. Hobson has attempted to define and understand the variations in reef-fish community structure that exist over the Hawaiian archipelago. The habitat varies widely, from reefs that fringe high volcanic islands, to other reefs that are the major substance of low coral atolls.

In the most recent segment of his study, Dr. Hobson was joined this month by biological technician Dan Howard to obtain data that would provide some understanding of the differences in community structure between windward and leeward sides of the high islands (Figure 1). Two islands were studied: Oahu and Hawaii. The leeward sites on Oahu were Hanauma Bay and Waianae, the windward sites were Mokulei and Pupakea. On Hawaii, leeward sites were at Alahaka, Honaunau, and Keel, whereas the windward sites were Laupahoehoe, Leweiwi and Kaimu.

Among their findings, Hobson and Howard noted that the most numerous reef fish species on leeward Hawaii, Chromis agilis, was absent on the windward

reefs of that island. Similarly, the second most numerous species, the surgeongish Zebrasoma flavescens, was sparsely distributed on windward reefs as an adult, but was numerous as juveniles in certain habits. These high numbers of juveniles occur only in some sheltered bays, where they live among branches of the coral Porites compressus, a form limited to relatively still waters. Thus, although juvenile Z. flavescens may find suitable habitats in some protected locations on the windward coast, these individuals face unfavorable conditions as adults, and most either perish or migrate to leeward reefs.

Figure 1. Dan Howard observes a small school of butterflyfish, Hemitaurichthys polylepis, during an assessment of the reef fish community structure on the island of Hawaii.

PHYSIOLOGICAL ECOLOGY INVESTIGATION

Tiburon Scientist to Serve on Aquatic Habitat Committee

Oceanographer Dr. R. Bruce MacFarlane has been appointed by the California State Water Resources Control Board to serve as a member of the

Aquatic Habitat Program's Regional Effects Technical Advisory Committee. The ultimate goal of the Aquatic Habitat Program is to establish an independent, nonprofit Aquatic Habitat Institute funded by federal, state, local and private sources. The Institute will provide monitoring and applied-research programs on pollutant-related effects for the San Francisco Bay-Delta estuary. The Technical Advisory Committee will provide scientific guidance for the design, development and implementation of these programs.

Progress Report on Effects of Chronic Benzene Exposure on Hematological and Blood Biochemical Parameters in Adult Striped Bass

The exposure phase of an experiment assessing the effects of sublethal concentrations of benzene in blood parameters in striped bass has been completed by Tiburon researchers. The objectives of this study were to determine if benzene produced primary and secondary physiological stress responses in striped bass and to identify "cause and effect" relationships between benzene and the impaired physiological processes which have been observed in striped bass from the San Francisco Bay-Delta. Toxic effects of benzene have been extensively documented in mammals, but are essentially unknown in fish; yet 68% of the striped bass sampled in 1978 from the San Francisco Bay-Delta contained benzene with liver concentrations ranging to 4.0 ppm.

The experimental design proposed exposure to 0.1 and 1.0 ppm benzene for 21 days. Due to the volatility of benzene, maintaining constant water concentrations is extremely difficult and has been a significant problem in past studies. Biological technician Brian Jarvis modified a dosing apparatus developed by research chemist Pete Benville that produced exceptionally stable benzene concentrations for the duration of the experiment, except for a "bout", in the latter stages of the exposure, with a bloom of "benzene-eating" bacteria. The mean exposure-concentrations of benzene for triplicate tanks were 1.008 $\pm$ 0.148 and 0.112 $\pm$ 0.012 ppm at high and low dosing levels, respectively.

Fish were sampled from test and control tanks at 4, 8, 24 and 48 hr of exposure and subsequently at 7, 14 and 21 days. Blood samples were rapidly collected and, depending upon the parameters assayed, either analyzed immediately or processed and stored for later analyses. The fish were then autopsied using procedures developed by Dr. Jeannette Whipple and tissue samples were fixed for future histological work. Benzene concentrations were determined in blood and liver of each fish. Blood parameters to be measured were reported in September. Although not all samples have been analyzed, and statistical analysis has not begun, the data produced so far indicate that benzene does cause changes in certain parameters that signal physiological stress.

Plasma glucose concentrations increased in exposed fish to 7 mM after 8 hr of exposure in both treatments and gradually returned to control levels (5 mM) during the remainder of the experiment. Similarly, blood lactate levels increased during the first 8 hr of benzene exposure and declined to lower, but

still elevated, levels for the experimental duration. The maximum lactate concentration (1.8 mM) was greater in fish exposed to 100 ppb benzene than in those exposed to 1.0 ppm benzene. In control fish, lactate concentrations were relatively constant at approximately 0.6 mM. Blood pH was reduced to 7.2-7.3 in exposed fish compared to control values of pH 7.4-7.5, with the greatest differences occurring in the first 8 hr of benzene exposure. No clear trends were evident for plasma triacylglycerols in exposed fish, but there appeared to be greater fluctuations of concentration than in controls.

Changes in the above compounds have been shown, in fish and other vertebrates, to be secondary stress responses mediated by the primary response, increased plasma glucocorticoid concentrations. Elevated glucocorticoid levels have been implicated in immunosuppression. A glucocorticoid response, produced by benzene, would provide a possible explanation for the observed changes in plasma glucose, lactate, etc., and might provide insight into the association between high tissue burdens of benzene (and related compounds) and the parasite infestation and ensuing tissue damage observed in Bay-Delta striped bass. Analyses of plasma glucocorticoids from the benzene exposure experiment are not complete; however, cortisol (the only glucocorticoid found in striped bass plasma) was moderately elevated in benzene-exposed fish during the first 24 hr.

The uptake of benzene into blood was rapid and stabilized at approximately 20X the water concentration. In fact, when the benzene concentration declined in the tanks with bacteria blooms, the blood benzene levels also declined proportionally and still reflected the 20X concentration factor.

Sample and data analyses will be completed within the next few months. When these results are integrated with data from the Bay-Delta field study the sublethal toxicological properties of benzene in striped bass will be more clearly defined.

PACIFIC ENVIRONMENTAL GROUP

FISHERY/ENVIRONMENTAL MODELING AND FORECASTING TASK

Northern Anchovy Analysis Completed

Statistician Donna Mallicoate, fishery biologist Dr. Richard Parrish, and California Department of Fish and Game marine biologist Rich Klingbeil have completed an analysis of the maturity stages and spawning evidence of northern anchovy, Engraulis mordax.

The data used in the study consisted of biological samples taken from the San Pedro, California, fishery (60,661 fish), Monterey, California, fishery (4,902 fish) and the Sea Survey Program (9,976 fish). All of these data were taken by the California Department of Fish and Game.

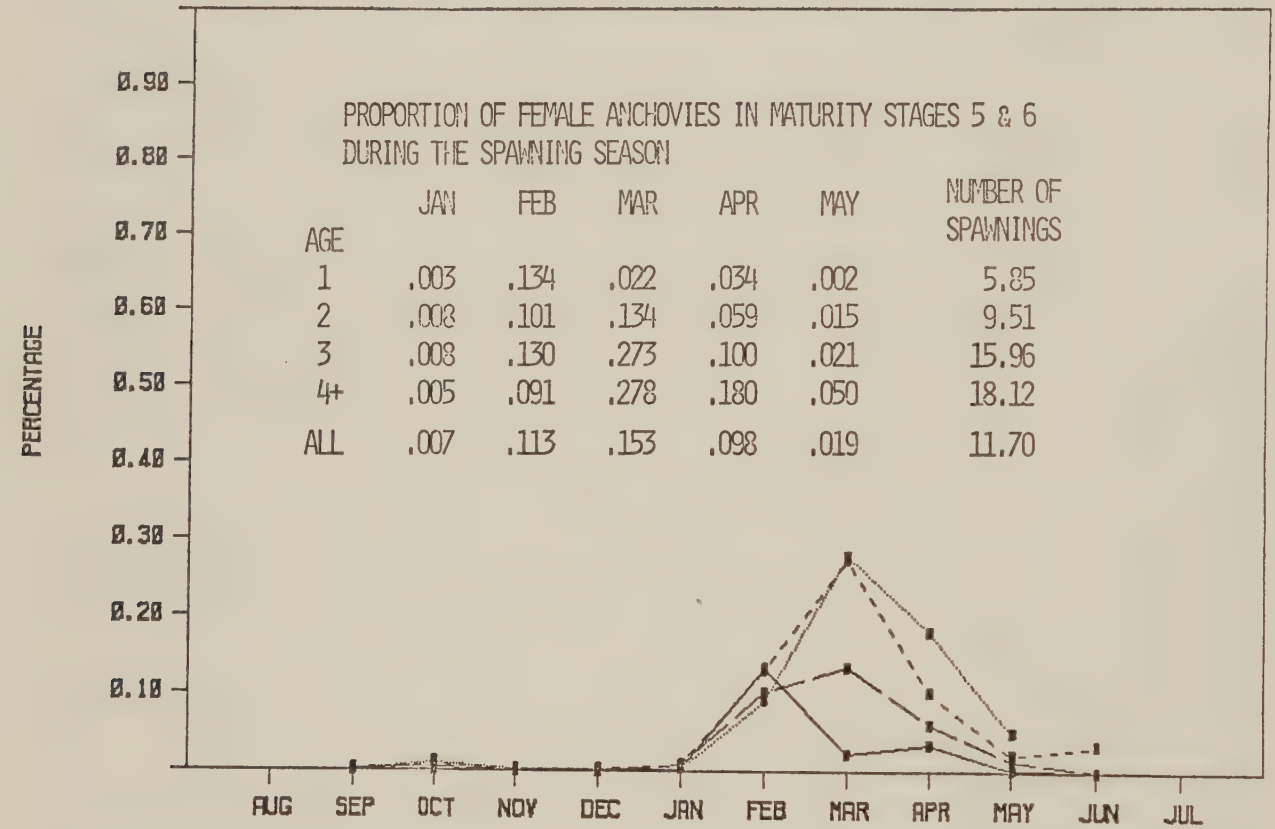
Seasonal cycles of maturity stages suggest that the peak spawning period is earlier (February-April) within the Southern California Bight than off of Monterey. In addition the Monterey samples show two spawning peaks (March-May and August-September) whereas only one occurs in the samples taken from the Southern California Bight. Spawning by younger, smaller anchovies tends to peak early in the spawning season. Older, larger anchovies appear to have a more extended spawning season and the proportion of fish at the higher maturity stages increases with age and size. In addition, fall spawning is almost entirely limited to older anchovies.

Hunter and Goldberg found that in February 16% $\pm$ 4% of female anchovies spawn per night. Combined maturity stage 5 (ovary extending the length of the body cavity, eggs transparent) and stage 6 (eggs ripe and running) of anchovies sampled in the Sea Survey Program shows that 15% of the females sampled from February to April between 1800 and 2200 hours were stages 5 and 6 and that the percentage of stages 5 and 6 drops off rapidly after 2300. The data from the San Pedro fishery shows that 11.3% of the females sampled during February were stage 5 and 6. The fisheries data has a low bias, because a significant proportion of the samples taken from the fishery were caught after the 2200-2300 spawning peaks.

The observed proportions of female anchovies in maturity stages 5 and 6 (hydrated eggs) show considerable variation with age and month, (Figure 1). Age 1 anchovies have a spawning incidence of about 13% in February but their spawning incidence is very much lower during the rest of the spawning season. Older anchovies have about the same spawning incidence as 1-year-olds in February but their spawning incidence remains high through April. Age 3 and 4 females have a spawning incidence peak of over 27% in March. Calculation of the number of spawning by age from the observed spawning incidences shows that 4-year-old females spawn about 3 times as many batches as 1-year-old females. All ages combined averaged 11.7 spawning during the period of January to May. When corrected for the low bias caused by sampling after the hours of peak

spawning (i.e., 16/11.3) the average number of spawns is 16.6 per female. This figure is a little less than the 20 spawnings per year estimate made by Hunter and Goldberg.

January-May fecundity for anchovies in the San Pedro fishery was calculated using Hunter and Macewicz's fecundity weight relationship, mean weight by age, and the observed spawning incidence. These calculations suggest that a 4-year-old female produces 4.8 times as many eggs per unit body weight as 1-year-old anchovies.



MATURITY STAGES 5+6 BY AGE FOR NORTHERN ANCHOVY TAKEN IN SAMPLES FROM THE SAN PEDRO FISHERY (FEMALES ONLY). AGE 1 = SOLID LINE, AGE 2 = LONG DASH, AGE 3 = SHORT DASH, AND AGE 4 = DOTTED LINE

FISHERIES INFORMATION SYSTEMS AND AUTOMATIC DATA PROCESSING

CALFIN and PACFIN Update

The final processing of the yearly summaries for the 1974, 1975, and 1976 commercial landings and vessel information in the Coastwide Data System is nearing completion. The Coastwide Data System contains detailed fishery landings and vessel data from the states of Washington, Oregon, and California. Numerous errors in the documentation of the system are being corrected to update and revise the general knowledge of the existing data sets. Tapes with incomplete information are being recycled, everything that is correct is being put on tape, and new backups are being made. All of this is being documented in a comprehensive report being composed at this time by Susan Iacometti, Computer Specialist.

For each year concerned, there are commercial landings (pounds and price) data in yearly, weekly, and daily time frames. In addition, vital statistics for vessels are divided into yearly files. Further processing may be done on the vessels information files to correlate some missing vessels with information that may have been incorrectly keypunched. At this time, the staff is waiting for input from the three states involved to begin processing the 1981 data set. The 1981 data will be in a similar format to the 1974-1975 data sets.

WAPCFIN Update

David C. Hamm, Computer Systems Analyst, reports several noteworthy accomplishments in the continuing implementation of the Western Pacific Fishery Information Network (WPACFIN). Hardware upgrades were made on all five microcomputer systems presently in operation, including installation of cooling fans on the microcomputers and installation of three new ROM chips on the printers, thereby increasing their capabilities.

Additional hardware for the central WPACFIN microcomputer was also installed, thus allowing communications at 1200 BAUD instead of the previously used 300 BAUD. This increase in transmission speed will significantly improve the efficiency of data transfer from the microcomputer and vice versa.

The contract to conduct a study and survey for the Guam Division of Aquatic and Wildlife Resources has been modified by expanding the study area to include the Commonwealth of the Northern Mariana Islands (CNMI) as well. The two areas will be studied and reported on as separate entitities, but the similarities among their fisheries, cultures, and data needs are expected to be used to develop a unified data collection system for the western Pacific. The goal of the survey design project is to develop sampling and survey strategies in Guam and CNMI that will help the local fishery agencies meet their data needs, and at the same time, meet the needs of the Southwest Fisheries Center (SWFC), and the WPRFMC. The schedule has been finalized for the contractor's visits to the Honolulu Laboratory for project review, and to Guam and CNMI for the study site investigations.

The Technical Subcommittee of the WPACFIN Data Goals Committee is scheduled to meet at the Honolulu Laboratory the week of 29 November 1982, to work on various technical, procedural, and operational aspects of implementing the information network. Following that meeting, the Data Goals Committee will meet to complete some unfinished business and to review the report on the Technical Subcommittee's activities. The major objective of the Data Goals Committee is to guide the implementation of WPACFIN to help insure that all participating agencies' data needs are met. The major objective of the Technical Subcommittee is to work out the technical aspects of the implementation.

A memorandum of understanding (MOU) on a joint effort to cooperate in the implementation of WPACFIN in CNMI has been signed by Dr. Izadore Barrett, SWFC Director, and Alan Ford, Southwest Regional Director. The MOU has been sent to CNMI for signing.

Purchase Requests Await Washington Approval

Dorothy Roll, Systems Analyst, reports that a reference letter for ADP Procurement Requests was sent to Ray Tillary in the National Marine Fisheries Service (NMFS) data management office in Washington, D.C. Mr. Tillary monitors all NMFS computer related procurement requests through the NOAA and DOC approval channels. The letter referred to the SWFC's ADP long range plan, submitted in 1981, which projected the computer requirements for all the laboratories of the Center. This reference letter would be cited in cover letters for all future computer hardware/software procurement requests from this Center. Two purchase requests are now in Washington, D.C., for approval: a 10-megabyte hard disk for the prototype La Jolla Standard Micro and the peripheral equipment and software for the Hewlett Packard 9826A microcomputer, used for oceanographic data collection and analysis.

Microcomputer Assembly Workshop Conducted

On October 27, William Tester, Electronic Consultant, conducted the first of three workshops on assembling the La Jolla Standard Microcomputer. In attendance were operations research analyst Jay Barlow, computer programmer analyst Robert Nydam, systems analyst Dorothy Roll, and fishery biologist William Lenarz (Tiburon Laboratory).

Each microcomputer consists of a power supply box, 2 Shugart #851 disk drives, 4 boards (disk controller, serial card, memory board, processor) and cables with connectors for interface with a CRT terminal. Some of the micros will have interface with a printer. During this work session the two microsystems for the Tiburon Laboratory were assembled and tested. These systems were then partially disassembled, crated, and loaded on the David Starr Jordan for delivery to the Tiburon Laboratory during the November rockfish population survey cruise.

Marine Mammal Stranding File for Southwest Region

For some time there has been an interest in the Southwest Regional office to create a Regional file for marine mammal strandings. This fiscal year the Smithsonian, which maintains a national file, has had some cutbacks in budget and personnel and will not be able to continue the stranding file without more active participation of the Regions. The Smithsonian has recently updated their old stranding data collection form and distributed it to appropriate people in the field.

From this form computer specialist John Davies created a file called "STRAND.DMS" on the ADP System, which contains all data from the collection form except for a couple of long text fields which will be maintained only on hardcopy. This file can be interactively accessed and ad hoc queries can be made using 1022 commands. There is also a report program ("STDR1.DMC") which will print out a list of strandings in the same format as the bulletin that the Smithsonian publishes. The program prompts for beginning and ending dates, and when these are entered it selects records between the two states, sorts on general category (Pinnipeds, Cetacea, etc.), genus, and date, then prints the report on 132 column paper. People interested in the material should contact Dana Seagars (FTS: 796-2518).

Foreign Fishing Billing Process Automated

Computer specialist John Davies was in Washington, D.C., October 17-25 to assist F/CM7 in automating the foreign fishing billing process. To date, the entire process has been done manually. Davies set up data files for catch and observer information, and adjusted the permit file so that it can be incorporated into the system, and programs written to produce "Bills for Collection." Davies will write a program in November that will summarize the information into a ledger form for accounting purposes. Once this is done it should satisfy John Kelly's (F/CM7) need for an automated billing system and Fred Bilik's (F/CM7) need for accountability in handling something on the order of $30 million a year related to foreign fishing.

Tiburon Computing Facilities to be Updated

Nancy Wiley, Computer Programmer Analyst from the Tiburon Laboratory, met with Dorothy Roll and Fred Kellenberger on October 13 to discuss the final configuration and procurement of the upgrade to Tiburon's computing facilities. Tiburon now has a Control Data Corporation Cyber 18-5M at its minimum configuration. This provides only the ability to act as a point-of-entry for services from outside computers. The acquisitions will create a Cyber 18-10M, with the capabilities of stand-alone computing, interactive data input-editing and inhouse program development. When installed, the new system will have the ability to grow with the computing demands of the Tiburon Laboratory, with the scientific tasks connecting their own terminals.

* * * * * * * * * * *

Sound proofing of the printer room in the ADP Operations area at the Southwest Fisheries Center in La Jolla has significantly reduced the noise level to the adjacent offices and users workroom. The modular inner walls were constructed and installed by Rush Construction of San Diego. The sound absorption blankets were hung by South Transmission Control, Inc., who performed the acoustical analysis of the noise problem.

MISCELLANEOUS

HONORS AND AWARDS

NOAA Agencies in San Diego Hold Open House to Celebrate 12th Birthday

NOAA was established on October 30, 1970, in the U.S. Department of Commerce, to expand the use of ocean resources and to monitor and predict conditions in the atmosphere, ocean, and space. To celebrate NOAA's 12th birthday, NOAA agencies in San Diego--the National Weather Service, the National Ocean Survey, the Environmental Data and Information Service, and the National Marine Fisheries Service's Southwest Fisheries Center and Southwest Region, and the NOAA Corps--joined forces in putting on an Open House, October 29 and October 30. The Open House was held at the La Jolla Laboratory, and aboard the NOAA research vessel David Starr Jordan.

Visitors to the La Jolla Laboratory saw cleared and stained "see-through" larval fish; models of the principal tuna species studied, as well as recently caught specimens (albacore, skipjack, and yellowfin tuna); plankton collecting nets and samples; a live-fish tank; a porpoise, whale, and shark model exhibit; and an exhibit on anchovy ageing techniques.

Visitors to the David Starr Jordan saw exhibits on the Coastal Marine Mammal Project which is conducted by the Southwest Fisheries Center; displays explaining the anchovy trawling done aboard the Jordan, as well as a large trawling net; an explanation of the broadbill swordfish fishery; and much of the equipment used by scientists in their ocean-going research projects.

In addition the Southwest Regional Office's field office in San Diego had an exhibit on the work conducted by National Marine Fisheries Service biological technicians who go to sea aboard U.S. tuna purse seiners to collect information on the tuna/porpoise interactions.

The National Weather Service, which has more than 300 NWS offices throughout the country to disseminate weather information, was represented with exhibits which included a continuous satellite film loop, service radio products, current maps, radiosondes, and handouts. Meteorologists from the San Diego office provided explanations of the services offered by the NWS.

During the 2-day Open House, estimated attendance at the Center was about 1,000 persons and approximately 1,200 visited the David Starr Jordan.

Honolulu Laboratory

The following Honolulu Laboratory personnel received performance awards this month:

Outstanding Performance: Joseph Arakawa, Alice May Drury, Melvin Dutro, Sr., Robert Humphreys, Jr., Walter Matsumoto, Tamotsu Nakata, Dorothy Powell, Darryl Tagami, Lucille Tsukano, James Uchiyama, Carole Yukihiro.

Sustained Superior Performance: Linda Barraclough, James Cooper, Jeri Davis, Mary Lynne Godfrey, Fletcher Riggs, Marian Y. Yong, Howard Yoshida.

La Jolla Laboratory

The following personnel received performance awards at a ceremony held October 25 at the La Jolla Laboratory:

Special Act Awards: Frank Ralston, Doug DeMaster, Ken Wallace, Julie Shoemaker, Robert Nishimoto, Ron Lynn, Ken Bliss, Dave Holts, Ron Dotson, Dimitry Abramenkoff, Ron Rinaldo, Earl Weber, Ruth Miller, Virginia Cass, William Brinkerhoff, Jacqueline Jennings, Sam Herrick, Robert Franco, Barbara Engstrand, Bruce Wahlen.

Those involved in development of the Egg Production Method were also recognized with cash awards (see May 1982 Monthly Report for details).

Quality Step Increase: Priscilla Sloan, Richard Charter, Robert Nishimoto, John Davies, Jr., Roderick Leong, Julie Shoemaker, Jim Thrailkill.

Sustained Superior Performance: Bill Sullivan, Ronnie Breda, Pedro Paloma, Chuck Oliver, Jim Squire, Mark Lowry, Eugene Holzapfel, Lisa Ferm, Al Myrick, Tom Polocheck, Phil Tarantino, Atilio Coan, Helen Becker, Virginia Hostler.

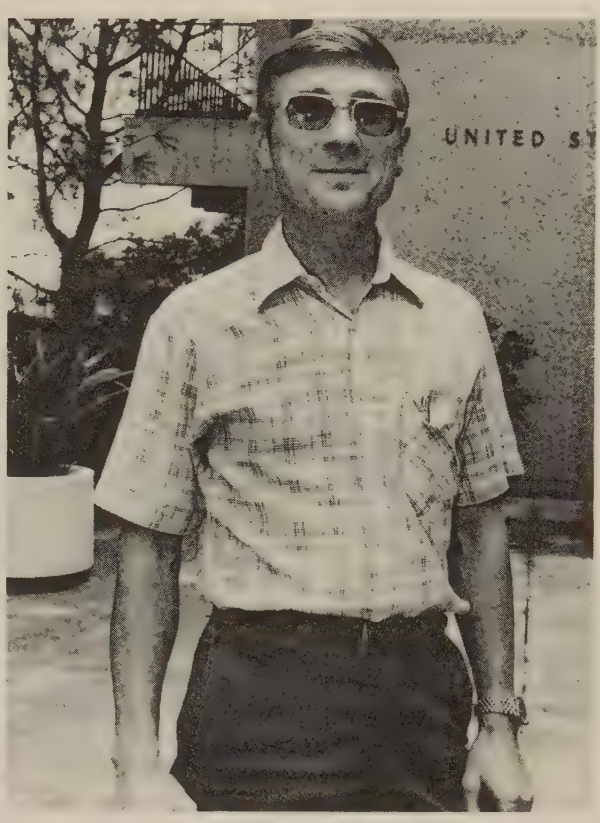
Outstanding Performance: Aleta Hohn, Merle Marrow.

Tiburon Laboratory

Walburga Giguere received an Outstanding Performance Award this month.

LA JOLLA LABORATORY'S AWARD WINNERS

(L-R) - Ronnie Breda, Bill Sullivan and Barb Engstrand.



Dimitry Abramenkoff.

(L-R) - Mark Lowry, Al Myrick, Jacqueline Jennings, Frank Ralston and Bruce Wahlen.

LA JOLLA LABORATORY'S AWARD WINNERS

(L-R) - Jim Thrailkill and Rich Charter

Merle Marrow

(L-R) - Ken Bliss, Ron Lynn and Robert Nishimoto.

PUBLIC AFFAIRS

Honolulu Laboratory

Robert Moffitt, who is in charge of the RAIOMA field station in Guam, prepared a display of deepwater shrimp and cooked shrimp samples (with recipes) for the World Food Day Exhibit in Guam. Moffitt reports that over 1,000 people visited the display, and 200 SWFC brochures were distributed. The visitors also sampled 30 pounds of shrimp.

Reginald Gooding gave a talk on the Honolulu Laboratory's participation in dives on the Hawaii Undersea Research Laboratory's submersible, Makalii, at a seminar for commercial and recreational fishermen arranged by local sports fishermen, Winfred Ho and Richard Fukumoto. Gooding included a 40-minute long video show from records made on the Makalii in his presentation. George R. Ariyoshi, Governor of Hawaii, was present at the seminar and spoke briefly to the group.

October 27 - William G. Gilmartin, Leader, Marine Mammal and Endangered Species Program, gave a talk on behavior patterns that may affect the survival of the Hawaiian monk seal, Monachus schauinslandi, at the Tenth Annual Conference of the International Marine Animal Trainers Association, Hawaiian Regent Hotel, Honolulu. Also, Michael Walker presented a talk, "Conditioned response for use in magnetic sensory discrimination studies in yellowfin tuna, Thunnus albacares," at the conference.

La Jolla Laboratory

October 20 - A meeting of the Southern California Association of Science Supervisors was held at the La Jolla Laboratory. In addition to their business meeting, attendants viewed a slide show on the Laboratory's activities, and toured the lab facilities.

Tiburon Laboratory

Octopus Display Presented at Fishermen's Festival

NOAA Corps Lt. Patrick Rutten and fishery biologist Sennen Salapare manned a National Marine Fisheries Service display at the annual Avila Beach Fishermen's Festival. They report that about 1,000 people stopped by the exhibit on octopus fishing. Most of those who were bold enough to sample the cooked marinated octopus tidbits that were given away found them to be delectable.

PRESS RELEASE

Honolulu Laboratory

October 4 - "NOAA Agencies to Invite Public to Open House."

5 - "Seafood consumption and exports up in Hawaii."

MEETINGS AND TRAVEL

October 5 - Laboratory Director Shomura convened a general staff meeting in the seminar room to discuss the Laboratory's fiscal year 1983 programs and other matters.

18 - Richard Shomura participated in the University of Hawaii Sea Grant Advisory Council meeting at the University of Hawaii campus.

20-22 - Richard Shomura traveled to La Jolla, California, to participate in the Center Management Meeting.

30 - Richard Shomura departed Honolulu to participate in the Indo-Pacific Fishery Commission and Indian Ocean Fishery Commission meetings in Bali, Indonesia.

La Jolla Laboratory

October 4-6 - Gary Sakagawa and Norm Bartoo traveled to Washington, D.C., to attend a pre-ICCAT Advisors meeting.

4-9 - Paul Smith traveled to Monterey, and Pacific Grove, California, to attend Eastern Pacific Oceanic Conference and hold research collaboration meeting with Pacific Environmental Group.

4-15 - Izadore Barrett traveled to Washington, D.C., to attend ICCAT Advisory Committee meeting and attend Regional/ Center Directors meeting.

4-30 - Angeles Alvarino traveled to La Paz, Mexico, to present a series of seminars at CICIMAR.

5 - An EEO Committee Meeting was held in the small conference room.

5-9 - Mike Laurs, Larry Eber, Ken Bliss, and Ron Lynn, traveled to Pacific Grove, California, to attend the 29th Eastern Pacific Oceanic Conference.

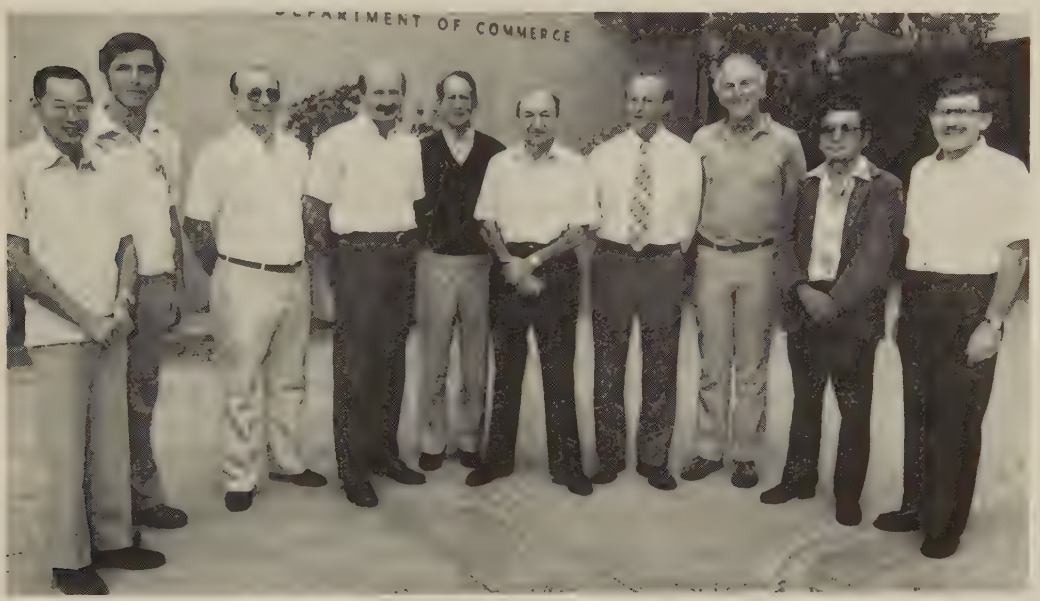
6-8 - Roger Hewitt traveled to Honolulu, Hawaii, to prepare NOAA Ship Townsend Cromwell for 1983 anchovy biomass survey.

6-12 - William Flerx, traveled to Honolulu, Hawaii, for a preliminary inspection of the Townsend Cromwell prior to SWFC Cruise 8302.

7 - A Computer Technical Users Meeting was held in the auditorium.

7-9 - Dan Huppert traveled to Friday Harbor, Washington, to attend annual workshop of the Western Association for Valuation of Ecosystems.

13 - Dave Mackett met with other State-Federal Coordinators.



Center Management Meeting Attendants (L-R): Gary Sakagawa, La Jolla Laboratory (LJ); Fred Kellenberger, LJ; Dave Mackett, LJ; John Carr, LJ; Ben Remington, LJ; Reuben Lasker, LJ; Gunter Seckel, Pacific Environmental Group; Norm Abramson, Tiburon Laboratory; Richard Shomura, Honolulu Laboratory; Izadore Barrett, Southwest Fisheries Center Director.

17-19 - Dan Huppert traveled to Washington, D.C., to work with B. Bellows, Fx53, on Report for NMFS Economists' Workshop.

17-25 - John Davies traveled to Washington, D.C., to assist F/CM7 in the development and implementation of a foreign fishing billing system.

21-22 - A Southwest Fisheries Center Management Meeting was held at the La Jolla Laboratory.

25-26 - Henry Orr traveled to Los Angeles, California, to attend a visual communications training course.

25-27 - Izadore Barrett and John Carr traveled to Idyllwild, California, to attend the 1982 Annual CalCOFI Conference.

25-28 - David Ambrose, Jack Brown, Larry Eber, Paul Fiedler, Roger Hewitt, John Hunter, Reuben Lasker, Mike Laurs, Roderick Leong, Nancy Lo, Alec MacCall, Eric Lynn, Rick Methot, Jack Metoyer, Bob Owen, Pete Paloma, Susan Picquelle, Steve Reilly, Elaine Sandknop, Paul Smith, Betsy Stevens, and Gail Theilacker traveled to Idyllwild, California, to attend the 1982 Annual CalCOFI Conference.

26-29 - Chuck Oliver and Mark Lowry traveled to San Clemente Island to continue studies on pinnipeds.

27 - John Butler traveled to Idyllwild, California, to attend the CalCOFI Conference.

28 - Administrators from the University of California, San Diego, met with Izadore Barrett, John Carr, and Fred Kellenberger, concerning telephone needs.

October 29-November 12 - Izadore Barrett, Norm Bartoo, David Au and John Graves traveled to Funchal, Madeira Island, Portugal, to participate in ICCAT Standing Committee on Research and Statistics; serve as rapporteurs for various species, and as subcommittee members.

October 29-November 17 - Gary Sakagawa traveled to Funchal, Madeira Island, Portugal, to participate in ICCAT Standing Committee on Research and Statistics; serve as rapporteur for various species and as subcommittee chairman and member.

October 31-November 4 - Barbara Engstrand traveled to Seattle, Washington, to attend a training course for Contracting Officers Technical Representatives.

Tiburon Laboratory

September 27-October 6 - Ted Hobson and Dan Howard traveled to Hawaii to do research on fish communities of the Hawaiian Archipelago.

6 - Ed Ueber met with Dr. Robert Francis in Seattle, Washington, to discuss multi-species fisheries management with reference to west coast groundfish management.

7-9 - Ed Ueber attended a meeting of the Western Association for Valuation of Ecosystems, Friday Harbor, Washington.

14 - Bill Leet traveled to Marysville, California, to demonstrate operation of our fish separator to a processor who is testing a new salmon product.

- Ed Ueber participated in a meeting of San Francisco Bay Sea Grant advisors in Daly City, California.

15 - Ed Ueber traveled to La Jolla, California, to discuss expenditure of SWC-SWR economic program funds.

16-17 - Pat Rutten and Sennen Salapare manned NMFS exhibits at Fishermen's Festival, Avila Beach, California.

18 - Pat Rutten and Sennen Salapare traveled to Morro Bay, California, where they met with fishermen to discuss future trapping trials for spot prawn, tanner crab, and California king crab.

19-22 - Bill Lenarz traveled to Portland, Oregon, to attend the Groundfish Team meeting at PFMC headquarters.

20-22 - Norman Abramson traveled to La Jolla, California, to attend the SWFC Management Meeting.

- Ted Hobson, Tony Chess, and Dan Howard traveled to Mendocino for the quarterly sampling series.

25-28 - Ted Hobson, Pete Adams and Susan Smith traveled to Idyllwild, California, to attend CalCOFI Conference.

26-28 - Sus Kato traveled to San Pedro to meet with Larry Bozanich of the Fishermen's Cooperative Association, San Pedro, California. Bill Craig and Joe Farrell of the Southwest Region were also at the meeting. Kato also met with fish processors and fishermen in San Pedro, Wilmington, and Los Angeles, California.

- Bill Lenarz traveled to San Diego, California, to attend a workshop on microcomputers.

27 - Nancy Wiley traveled to San Diego, California, to attend microcomputer workshop and process ADP procurement papers.

Pacific Environmental Group

October 18-22 - Gunter R. Seckel traveled to Boulder, Colorado, to attend the Climate Diagnostic Workshop. He also attended the Center Management Meeting in La Jolla, California.

25-29 - Dr. Douglas McLain, Dr. Richard Parrish, Ms. Donna Mallicoate and Mr. Paul Sund attended the CalCOFI Meeting in Idyllwild, California.

VISITORS

Honolulu Laboratory

October 8 - Richard Shomura was visited by Dale C. Gough, Director, and John T. Hinman, Chief, Administrative Operations Division, NASO.

25 - Robert B. Brumsted, Office of Conservation and Management, Washington, D.C., met with Richard Shomura and William Gilmartin to review monk seal and turtle research in Hawaii.

26 - Sue Miller of the University of Hawaii Sea Grant Program met with Richard Shomura to discuss her Delphi project on Northwestern Hawaiian Island resources.

La Jolla Laboratory

September 30-October 5 - Dr. Alexander Christakis, Associate Director, The Center for Interactive Management, University of Virginia, met with Dave Mackett.

October 5 - Bob Worrest, U.S. Environmental Protection Agency, visited the Laboratory.

6 - Dr. Maria Helena Barahona-Fernandes, Chief Mariculture Scientist for Portugal, met with Laboratory personnel.

19 - Arie Korporaal, L.A. County Department of Education, visited the Laboratory.

22 - Dawn Rawls, Scripps Institution of Oceanography, visited the Laboratory.

26 - Francisco Venegas, Secretary of Fisheries, B.C.S., Mexico, and Jose R. Turrubiates, Secretary of Fisheries, B.C.S., Mexico, met with Laboratory personnel.

28 - Dr. Erick Bertelsen, Director of the Zoological Laboratory at the University of Copenhagen, met with Dr. Geoff Moser.

29 - Hiromichi Ito, Public Affairs Program Advisor, Fukuoka American Center, Japan, was a guest at the Center.

- Rear Admiral Justin E. Langille, III, new Deputy Director of the Scripps Institution of Oceanography, and Mr. Jeff Frautschy, the retiring Director, met with John Carr, Dr. Reuben Lasker, and Dr. Bill Perrin during the Laboratory's Open House.

- Judge George Lazar, San Diego, and Pete Hogan of Supervisor Paul Fordem's office, were guests at the Center's Open House at La Jolla.

- Supervisor Roger Hedgecock and son James visited the Jordan during Open House.

- Donna Mallicoate and Dick Parrish from the Pacific Environmental Group in Monterey, California, visited the Laboratory.

Tiburon Laboratory

October 1 - Bo Benetbson, National Board of Fisheries, Sweden, visited the Laboratory.

- Per Nyberg, Institute of Freshwater Research, Drottingholm, Sweden, visited the Laboratory.

- Harold U. Sverdrup, University of Lund, Sweden, visited the Laboratory.

7 - Eddie Tate and Dian Stewart, NOAA/WASC, Seattle, Washington, visited the Laboratory.

25 - Randy Buddington, U.C. Davis Aquaculture Program visited the Laboratory.

- Mary Ann McEnroe, Department of Zoology, U.C. Davis visited the Laboratory.

- George Monaco, U.C. Davis Aquaculture/Science Program visited the Laboratory.

- Devin Bartley, U.C. Davis/San Diego State University Animal Science, U.C. Davis, visited the Laboratory.

- J.J. Cech, Wildlife and Fisheries Biology, U.C. Davis, visited the Laboratory.

- Ken Blain and six wardens Department of Fish and Game, Yountville, California, visited the Laboratory.

- R.T. Nelson, Bodega Marine Laboratory, Bodega Bay, California, visited the Laboratory.

- Abe Cuanang, U.S. Davis Sturgeon Program, visited the Laboratory.

- Ray Swanson, Horizon Fish, Corte Madera, California, visited the Laboratory.

Pacific Environmental Group

October 7 - Professor Maria Helena Barahona-Fernandes of the University of Lisbon, Department of Zoology, Lisbon, Portugal, visited the Laboratory.

PERSONNEL ACTIONS

Honolulu Laboratory

October 4 - Michael P. Seki, Biological Technician (Fisheries) Conversion of Temporary Appointment.

12 - Richard A. Bierma, Biological Technician (Fisheries) - Termination.

13 - Alan R. Everson, Biological Technician (Fisheries) - Extension of Temporary Appointment.

- Steven H. Kramer, Biological Technician (Fisheries) - Extension of Temporary Appointment.

- Nathaniel T. Shippen, Biological Technician (Fisheries) - Extension of Temporary Appointment.

15 - Henry M. Kishinami, Biological Aid (Fisheries) - Termination.

29 - William B. Barnett, Biological Technician (Fisheries) - Termination.

- Walter N. Ikehara, Biological Technician (Fisheries) - Termination.

- Louise F. Lembeck, Editorial Clerk (Typing) - Termination.

La Jolla Laboratory

October 9 - Helen Hills, Computer Clerk - Termination.

30 - Kathleen Coleman, Scientific Illustrator - Termination.

Tiburon Laboratory

October 1 - Rachel Fischer, Editorial Assistant - Resignation.

3 - Carol A. Reilly, Fishery Biologist - Leave without pay NTE 11/30/82.

18 - Katherine A. Payne, Clerk-Typist - Full-time Permanent Appointment.

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